ejpmr, 2024, 11(8), 01-03

SJIF Impact Factor 7.065

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

THE RELATIONSHIP BETWEEN SERUM HEPCIDIN LEVELS AND SMOKING IN BREAST CANCER PATIENTS: A CROSS-SECTIONAL STUDY

Zein Al-Abideen Douba[1]* and Rama Ibrahim[1,2]

[1]Department of Biochemistry and Microbiology, Faculty of Pharmacy, Tishreen University. Lattakia, Syria.
[2]Department of Biochemistry and Microbiology, Faculty of Pharmacy, Al-Sham Private University (ASPU). Lattakia, Syria.

***Corresponding Author: Zein Al-Abideen Douba**

Department of Biochemistry and Microbiology, Faculty of Pharmacy, Tishreen University. Lattakia, Syria.

Article Received on 06/06/2024 **Article Revised on 26/06/2024** **Article Accepted on 16/07/2024**

ABSTRACT

Background: Breast cancer remains a leading cause of cancer-related morbidity and mortality among women worldwide. Hepcidin, a central regulator of iron metabolism, has emerged as a potential biomarker in cancer biology. **Objectives:** This study aims to investigate the relationship between serum hepcidin levels and smoking status in breast cancer patients, and to assess the association between smoking and cancer relapse. **Materials and Methods:** Serum samples were collected from 39 breast cancer patients across Stages 1, 2, and 3. Hepcidin levels were measured using ELISA. Patients were categorized based on smoking status. The chi-square test was used to evaluate the associations between smoking, hepcidin levels, and relapse. **Results:** No significant association was found between smoking status and serum hepcidin levels (P = 0.43). Similarly, smoking status was not significantly associated with cancer relapse (P = 0.15).

KEYWORDS: Hepcidin, Breast cancer, Relapse, Smoking, Oncology.

1. INTRODUCTION

Breast cancer is one of the most common malignancies affecting women, with significant implications for public health globally.[1] The etiology of breast cancer involves a complex interplay of genetic, hormonal, and environmental factors. Advances in early detection and treatment have improved survival rates, but challenges remain in understanding the factors influencing disease progression and relapse.[2]

Hepcidin is a peptide hormone produced by the liver that regulates iron homeostasis by inhibiting ferroportin[3], the iron exporter. Its role in cancer biology has garnered attention due to its regulatory function on iron, which is crucial for cell proliferation and metabolism.[4] Elevated hepcidin levels have been observed in various cancers, suggesting a potential role in tumor growth and progression.[5]

Smoking is a well-established risk factor for many cancers, including breast cancer.[6,7] The carcinogens in tobacco smoke can induce genetic mutations and promote a pro-inflammatory environment, contributing to cancer development and progression.[7] However, the relationship between smoking and hepcidin levels in breast cancer patients remains underexplored.

Several studies have attempted to elucidate the impact of smoking on hepcidin levels, yielding mixed results. Some research suggests that smoking may elevate hepcidin levels due to increased inflammatory markers, while other studies report no significant effect.[8,10] Understanding the interaction between smoking and hepcidin levels in breast cancer patients could provide valuable insights into disease mechanisms and potential therapeutic targets.

This study aims to explore the association between smoking status and serum hepcidin levels in breast cancer patients. Additionally, it seeks to determine whether smoking influences the likelihood of cancer relapse. By investigating these relationships, this study hopes to contribute to the broader understanding of breast cancer progression and the role of lifestyle factors in patient outcomes.

2. MATERIALS AND METHODS

2.1 Study Population

This cross-sectional study included 39 breast cancer patients recruited from a single oncology center. The patients were evenly distributed across three stages of breast cancer: 13 patients in Stage 1, 13 in Stage 2, and 13 in Stage 3.

2.2 Sample Collection
Serum samples were drawn from each participant. The samples were processed and stored at -20 °C until analysis.

2.3 Hepcidin Measurement
Serum hepcidin levels were quantified using a commercially available enzyme-linked immunosorbent assay (ELISA) kit according to the manufacturer's instructions. Patients were categorized into low and high hepcidin groups based on the median hepcidin level.

2.4 Smoking Status
Smoking status was determined through patient self-reporting and categorized as either smoker or non-smoker.

2.5 Statistical Analysis
Chi-square tests were conducted to assess the relationship between smoking status and serum hepcidin levels, as well as between smoking status and cancer relapse. A *p*-value of less than 0.05 was considered statistically significant**.**

4. RESULTS
4.1 Hepcidin Levels and Smoking Status
The distribution of patients by hepcidin levels and smoking status is presented in Table 1.

Table 1.

Smoking Status	Low Hepcidin	High Hepcidin	Total
No	9	7	16
Yes	10	13	23
Total	19	20	39

Chi-square analysis indicated no significant association between smoking status and serum hepcidin levels ($p = 0.43$).

4.2 Smoking Status and Cancer Relapse
The distribution of patients by smoking status and cancer relapse is shown in Table 2.

Table 2.

Smoking Status	Low Hepcidin	High Hepcidin	Total
Smoking Status	**No Relapse**	**Relapse**	**Total**
No	12	4	16
Yes	12	11	23
Total	24	15	39

Chi-square analysis showed no significant association between smoking status and cancer relapse ($p = 0.15$).

5. DISCUSSION
This study aimed to elucidate the relationship between smoking status and serum hepcidin levels in breast cancer patients, as well as to explore the potential impact of smoking on cancer relapse. Our findings indicate no significant association between smoking status and serum hepcidin levels. Similarly, smoking was not significantly associated with an increased risk of cancer relapse.

The lack of association between smoking and hepcidin levels suggests that, in this cohort, smoking may not significantly influence hepcidin regulation. This finding is consistent with some previous studies but contrasts with others that reported elevated hepcidin levels in smokers.[11,15] The variability in results across studies may be attributed to differences in study populations, methodologies, and sample sizes.

Regarding cancer relapse, our results indicate that smoking status does not significantly affect the likelihood of relapse in breast cancer patients. This is in line with some literature suggesting that while smoking is a risk factor for the initial development of various cancers, its impact on relapse may be less pronounced and influenced by a multitude of other factors, including treatment protocols, genetic predispositions, and overall health status.[16,20]

Several limitations should be considered when interpreting these results. The sample size of this study was relatively small, which may limit the generalizability of the findings. Additionally, self-reported smoking status may be subject to reporting biases. Future studies with larger sample sizes and more rigorous verification of smoking status could provide more definitive conclusions.

Despite these limitations, this study contributes to the understanding of the complex interplay between lifestyle factors and cancer biology. The findings suggest that while smoking is a critical factor in cancer development, its role in modulating serum hepcidin levels and influencing relapse may be limited. Further research is warranted to explore the underlying mechanisms and to identify other potential biomarkers that may interact with smoking in breast cancer progression.

6. CONCLUSION

This study found no significant relationship between smoking status and serum hepcidin levels or cancer relapse in breast cancer patients. These findings suggest that smoking may not significantly impact hepcidin regulation or relapse risk in this patient population. Future research should focus on larger, longitudinal studies to confirm these findings and to explore other factors influencing hepcidin levels and cancer outcomes.

7. ACKNOWLEDGEMENT

The authors would like to thank the participants of this study and the staff at the oncology center for their assistance and cooperation especially Dr. Yazan Maamar.

8. REFERENCES

1. Sung, H., et al., *Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries.* CA: a cancer journal for clinicians, 2021; 71(3): 209-249.
2. Tao, Z., et al., *Breast cancer: epidemiology and etiology.* Cell biochemistry and biophysics, 2015; 72: 333-338.
3. Nemeth, E. and T. Ganz, *The role of hepcidin in iron metabolism.* Acta haematologica, 2009; 122(2-3): 78-86.
4. Vela, D. and Z. Vela-Gaxha, *Differential regulation of hepcidin in cancer and non-cancer tissues and its clinical implications.* Experimental & molecular medicine, 2018; 50(2): e436-e436.
5. Tesfay, L., et al., *Hepcidin regulation in prostate and its disruption in prostate cancer.* Cancer research, 2015; 75(11): 2254-2263.
6. Gaudet, M.M., et al., *Active smoking and breast cancer risk: original cohort data and meta-analysis.* Journal of the National Cancer Institute, 2013; 105(8): 515-525.
7. Reynolds, P., *Smoking and breast cancer.* Journal of mammary gland biology and neoplasia, 2013; 18: 15-23.
8. Mustafa, A.J., et al., *Serum Iron, Ferritin, Erythroferrone and their Inter-Correlation In Adult Cigarette Smokers: A Case-Control study.* Iraqi Journal of Science, 2023; 5491-5500.
9. Chełchowska, M., et al., *Active tobacco smoke exposure in utero and concentrations of hepcidin and selected iron parameters in newborns.* International Journal of Environmental Research and Public Health, 2019; 16(11): 1996.
10. Chełchowska, M., et al., *Hepcidin and iron metabolism in pregnancy: correlation with smoking and birth weight and length.* Biological trace element research, 2016; 173: 14-20.
11. Zhang, W.Z., J.J. Butler, and S.M. Cloonan, *Smoking-induced iron dysregulation in the lung.* Free Radical Biology and Medicine, 2019; 133: 238-247.
12. Galesloot, T.E., et al., *Serum hepcidin: reference ranges and biochemical correlates in the general population.* Blood, The Journal of the American Society of Hematology, 2011; 117(25): e218-e225.
13. Wadowska, K., et al., *Hepcidin as a diagnostic biomarker in anaemic lung cancer patients.* Cancers, 2022; 15(1): 224.
14. Vadhan-Raj, S., et al., *A first-in-human phase 1 study of a hepcidin monoclonal antibody, LY2787106, in cancer-associated anemia.* Journal of hematology & oncology, 2017; 10: 1-12.
15. Toshiyama, R., et al., *Association of iron metabolic enzyme hepcidin expression levels with the prognosis of patients with pancreatic cancer.* Oncology Letters, 2018; 15(5): 8125-8133.
16. Bérubé, S., et al., *Smoking at time of diagnosis and breast cancer-specific survival: new findings and systematic review with meta-analysis.* Breast Cancer Research, 2014; 16: 1-11.
17. Alkhaifi, M., et al., *The association between smoking status and breast cancer recurrence: A systematic review.* Journal of Breast Cancer, 2022; 25(4): 278.
18. Wong, G., et al., *The impact of smoking on adjuvant breast cancer radiation treatment: A systematic review.* Cancer Treatment and Research Communications, 2020; 24: 100185.
19. Bishop, J.D., et al., *Smoking and breast cancer recurrence after breast conservation therapy.* International journal of breast cancer, 2014; 2014(1): 327081.
20. Takada, K., et al., *The effect of smoking on biological change of recurrent breast cancer.* Journal of Translational Medicine, 2020; 18: 1-12.